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# WHAT MATHEMATICAL SUBJECTS SHOULD BE INCLUDED IN THE COLLEGE CURRICULUM?

By F. J. Holder.

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cises, measurement, and experiment, nor does it preclude such practical devices as models, apparatus, photographs, cross-ruled paper, and the like. It is a practical device which serves to make easier the comprehension of mathematical truths. A reasonable number of applied problems creates an interest in the mind of the pupil that reacts strongly in increasing his understanding and appreciation of the logical side of the subject. They supply the student with a motive, and help create an interest in his work. They enable him to approach the abstract through the concrete, and assist in fixing general mathematical principles by furnishing a concrete illustration or application for many of the truths of algebra and geometry. On the other hand, to attempt to make our algebra and geometry relate too closely to the material problems of life is to make of them but chapters in a higher arithmetic, and is to lose in their study most of the value that is peculiar to them.

The most practical knowledge of any subject that one can have is a knowledge of its theory, its principle, and its methods. Such a knowledge may be called a potential knowledge. It is a stored-up aggregation of habits of thought which may be drawn upon long after an algebraic formula or a geometric theorem is forgotten. How often does an engineer have occasion to use his calculus, or how many of them could apply it if they would? And yet their mathematical training is of inestimable practical value to them in their work. Through their study of mathematics they have acquired an ability to grasp the essential elements of a problem, a capacity for accurate analysis, a power of visualization, a training of the geometric imagination, that makes possible the wonderful structures which it is their business to create.

In the growing demand of the present day for a practical education, we are inclined to strive after the obvious utilities, and to overlook the more comprehensive utilities which contribute toward an ideal and intellectual practicality, and, at the same time, are of direct value in even our bread-winning activities. Professor David Eugene Smith, of Columbia University, in "The Teaching of Geometry" presents, in forceful and persuasive language, a defence of the attitude of the conservatives toward the modifications urged by a multitude of teachers in the subject matter and method of geometry. In this connection he advocates the retention in textbooks of proofs long known to be false as well as useless. This book should prove interesting to teachers in sympathy with the modern movement and should furnish arguments to conservative teachers with which to strengthen their position.

I believe we should maintain a respectable standard of efficiency in whatever subjects we propose to include in the college curriculum. It seems to me that there is a growing tendency to lessen the requirements in the regular daily and term work and to give the student the impression that his final grade depends too largely upon his attendance and deportment without due consideration of his scholarly achievements. We claim to give our courses in accordance with the ability of the average of the class while, in reality, they measure up only to the standard of the poorer students and, in many cases, fall far short of encouraging and stimulating the good students to their best efforts. We are so taken up with the care and attention of the ill prepared, to prevent their falling by the wayside, that we often neglect, and fail to develop, our very best material. But, you say, "What about our *required* courses in which we have to deal, not merely with the mathematically inclined, but with those unfortunate specimens of humanity whom the Lord never intended for mathematicians?" That is just the point I want to make. I grant that they should be given all due consideration, help, sympathy, and encouragement, for, whether we feel free to openly acknowledge it or not, we are more or less impressed with the fact that the dean and the president have gone out into the highways and hedges and brought in these specimens and, while it is their duty to get all they can, they have employed us to keep all they get. Undoubtedly, this idea of bigness, of name and fame, is making its impression upon our American colleges and universities, and the ambition to be great and popular is not monopolized by the dean and president, but it is entertained by the members of the faculty as well. I believe we, as a faculty, should feel a responsibility for the entire student body and should endeavor to develop our best, as well as our poorest, material, and if it turns out that the dean and the president, in gathering up their raw recruits, have picked one of their fruits too green and, after giving it a fair and impartial chance to ripen with all the cultivation we have to offer, we are convinced that it is a dwarf, not only in mathematics but in every other subject in the curriculum, these same officials will be the first men to stand by us in sending this individual back to the orchard for further growth and maturity, and this deed will be a blessing to him as well as to those who remain.

I believe that a college degree should mean more than a mere four years' attendance on the campus, an athletic letter, a Greek letter fraternity pin, and the ability to drink a glass of Budweiser without removing the half-inch cigarette stub from the other corner of the mouth. It should mean that the one who bears the college seal and stamp has learned to apply himself to the task to be done, to meet and overcome difficulties, to recognize the rights of others and to sympathize with the less fortunate, and that he is possessed with the determination to use his powers of concentration, logical reasoning, and sound judgment, for the betterment of humanity and the progress of civilization.

I know of no department in the college better adapted and more fully equipped to set the pace in this direction than that of mathematics, and to this end we should have as our motto: "Give the student something worth while, expect a reasonable response, and then see that we get it."

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